Attorney Docket No. 1022702-000291

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of Gilbert BLANCHARD Application No.: 10/551,914 Filed: September 30, 2005 For: COLLOIDAL DISPERSION OF A RARE EARTH COMPOUND COMPRISING AN ANTI-OXIDANT AGENT AND USE THEREOF AS ADDITIVE FOR DIESEL FUEL FOR INTERNAL COMBUSTION ENGINES	**MAIL STOP** **APPEAL BRIEF - PATENTS** Group Art Unit: 1775 Examiner: Chantel Loran Graham Appeal No.: _____

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This appeal responds to the Advisory Action dated December 20, 2010 and the Final Office Action dated July 9, 2010 finally rejecting claims 16-19, 22, 24-34, 36, and 37, which are reproduced as the Claims Appendix of this brief.

☒ Charge ☐ $ 270 ☒ $ 540 to Credit Card. Form PTO-2038 is attached.

The Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§1.16, 1.17, and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800.

I. Real Party in Interest

The present application was orginally assigned to Rhodia Electronics and Catalysis. Rhodia Electronics and Catalysis was dissolved, with all its property rights being transferred to Rhodia Operations. Rhodia Operations is the real party in interest, and is the assignee of Application No. 10/551,914.

II. Related Appeals and Interferences

The Appellant legal representative, or assignee, does not know of any other appeal or interferences which will affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

III. Status of Claims

Claims 16-19, 22, 24-34, 36, and 37 are pending in this application. Each of claims 16-19, 22, 24-34, 36, and 37 has been finally rejected by the Office, which final rejection is appealed.

IV. Status of Amendments

The Amendment submitted on December 8, 2010 has been entered and considered by the Office, as indicated in the Advisory Action dated December 20, 2010. A Notice of Appeal was submitted on January 10, 2011.

V. Summary Claimed Subject Matter

Pursuant to 37 C.F.R. §41.37(1)(c)(v), the subject matter of each independent claim on appeal (claims 1, 25, 30, 36 and 37) is cross-referenced to the specification in the following tables:

Claim 1	**Cross-Reference to the Disclosure**
A colloidal dispersion comprising	Page 1, lines 8-9, page 2, lines 22-26.
particles of a rare earth compound,	Page 2, lines 2-3.
an acid,	Page 2, line 3.
an organic phase,	Page 2, line 3.
an antioxidant, and	Page 2, line 5.
an element E;	Page 3, lines 20-23.
wherein at least 90% by weight of the particles are monocrystalline,	Page 7, lines 16-18.
wherein the rare earth compound is cerium	Page 3, lines 1-2 and 11-12; Example 1.
and the element E is iron.	Page 3, lines 19-25; Example 1.
Claim 25	**Cross-Reference to the Disclosure**
A colloidal dispersion comprising	Page 1, lines 8-9; page 2, lines 22-26.
particles of a rare earth compound,	Page 2, lines 2-3.
an acid,	Page 2, line 3.
an organic phase,	Page 2, line 3.

an antioxidant, and	Page 2, line 5.
an element E,	Page 3, lines 20-23.
wherein the particles are not larger than 200 nm,	Page 8, lines 26-27.
said dispersion having the following characteristics: said particles are in the form of aggregates of crystallites whose d_{80}, advantageously d_{90}, is not more than 5 nanometers, 90% (by weight) or more of the aggregates comprising 1 to 5 crystallites; and	Page 8, lines 30-35.
the acid is an amphiphilic acid comprising at least one acid with 11 to 50 carbon atoms, having at least one alpha, beta, gamma, or delta branch of the atom bearing the acidic hydrogen,	Page 8, lines 35-38.
wherein the rare earth compound is cerium	Page 3, lines 1-2 and 11-12; Example 1.
and the element E is iron.	Page 3, lines 19-25; Example 1.
Claim 30	**Cross-Reference to the Disclosure**
A fuel additive in the form of a colloidal	Page 13, lines 5-10.

dispersion, the colloidal dispersion comprising	
particles of a rare earth compound,	Page 2, lines 2-3.
an acid,	Page 2, line 3.
an organic phase,	Page 2, line 3.
an antioxidant, and	Page 2, line 5.
an element E,	Page 3, lines 20-23.
wherein an atomic ratio of antioxidant to rare earth compound and the element E is 0.2 to 5.0 and	Page 12, lines 35-38.
wherein the rare earth compound is cerium	Page 3, lines 1-2 and 11-12; Example 1.
and the element E is iron.	Page 3, lines 19-25; Example 1.
Claim 36	**Cross-Reference to the Disclosure**
A method comprising: (a) providing a colloidal dispersion comprising particles of a rare earth compound, an acid, an organic phase, an antioxidant, and an element E,	Page 1, lines 8-9, page 2, lines 22-2, and page 2, lines 2-5
wherein at least 90% by weight of the particles of the rare earth compound are monocrystalline; and	Page 7, lines 16-18.

(b) combining the colloidal dispersion with a fuel for an internal combustion engine, thereby achieving enhanced stability of the particles of the rare earth compound in the fuel,	Page 13, lines 7-9, lines 17-19, and page 14, lines 9-12.
wherein the rare earth compound is cerium	Page 3, lines 1-2 and 11-12; Example 1.
and the element E is iron.	Page 3, lines 19-25; Example 1.
Claim 37	**Cross-Reference to the Disclosure**
A method comprising: (a) providing a colloidal dispersion comprising particles of a rare earth compound, an acid, an organic phase, an antioxidant, and an element E,	Page 1, lines 8-9, page 2, lines 22-2, and page 2, lines 2-5
wherein the particles of the rare earth compound are not larger than 200 nm and are in the form of aggregates of crystallites whose d_{80}, advantageously d_{90}, is not more than 5 nanometers, 90% (by weight) or more of the aggregates comprising 1 to 5 crystallites, and	Page 8, lines 26-27 and 30-35.
the acid is an amphiphilic acid comprising at least one acid with 11 to 50	Page 8, lines 35-38.

carbon atoms, having at least one alpha, beta, gamma, or delta branch of the atom bearing the acidic hydrogen; and	
(b) combining the colloidal dispersion with a fuel for an internal combustion engine, thereby achieving enhanced stability of the particles of the rare earth compound in the fuel,	Page 13, lines 7-9, lines 17-19, and page 14, lines 9-12.
wherein the rare earth compound is cerium	Page 3, lines 1-2 and 11-12; Example 1.
and the element E is iron.	Page 3, lines 19-25; Example 1.

The portions of the specification have been identified above in order to comply with the requirements of 37 C.F.R. §41.37(c)(1)(v). The above references to the specification should not be construed as limiting the scope of the claimed subject matter to the various embodiments described in the specification, or otherwise as a vehicle for importing limitations into the claims from the specification. No representation is made that the above-identified portions of the disclosure are the only basis for support for the claimed subject matter.

VI. Grounds of Rejection to be Reviewed on Appeal

The issue to be reviewed in this appeal is:

Whether claims 16-19, 22, 24-34 and 36-37 have been properly rejected under 35 U.S.C. §103(a) as allegedly unpatentable over International Application No.

WO 01/10545 to Blanchard et al. ("Blanchard") in view of U.S. Patent Publication No. 2005/0066571 to Wakefield ("Wakefield").

VII. Argument

A. Background

The present invention is directed to a colloidal dispersion comprising particles of a rare earth compound, an acid, an organic phase, an antioxidant, and an element E. The colloidal dispersion may be used as an additive for fuels. Prior art fuel additives including rare earth compounds, when combined with fuels, precipitate when the dispersion is contacted with the fuel. In contrast, the colloidal dispersion of the present invention includes antioxidants which unexpectedly improve the ability of rare earth compounds to remain in a condition of colloidal dispersion. (See, e.g., Example 1 of the specification).

B. Legal Principles

Under 35 U.S.C. § 103(a), the Examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. M.P.E.P. § 2142. As set forth in M.P.E.P. § 2143, one requirement for establishing a *prima facie* case of obviousness is that the combination of references must teach or suggest all the claimed features. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Moreover, evidence of unobvious or unexpected advantageous properties, such as superiority in a property the claimed compound shares with the prior art, can rebut *prima facie* obviousness. MPEP §716.02(a)(II). The PTO must consider

comparative data in the specification in determining whether the claimed invention is patentable. *In re Soni*, 34 USPQ2d 1684, 1687 (Fed. Cir. 1995).

C. Rejection of Claims 16-19, 22, 24-34 and 36-37 under 35 U.S.C. §103(a) over Blanchard in view of Wakefield

1. Rejection of Claim 16

Appellants maintain that the references as combined fail to teach or suggest all features of Claim 16.

The Office Action admits that "Blanchard does not specifically teach antioxidants," but contends that "the diluents of aromatic solvents and alcohols are equivalent to antioxidants." (Final Office Action at page 4)

Blanchard discloses colloidal dispersions of rare earth, but there is no disclosure in Blanchard of the addition of an antioxidant agent or that the presence of an antioxidant in a dispersion enhances the stability of particles in a fuel. Instead, Blanchard discloses the use of cryo-TEM to examine the state of aggregation of the elementary particles. The samples are kept frozen in their natural medium, which is either water or organic diluents such as aromatic or aliphatic solvents, for example Solvesso or Isopar, or certain alcohols such as ethanol. (See paragraph [0026]). Thus, the diluents, which the Office Action alleges are used as antioxidants, are used only for examination of samples to freeze the particles and help determine aggregation thereof by TEM. However, there is no teaching or suggestion in Blanchard to include the diluents in organic colloidal dispersion for addition to fuels.

Moreover, Wakefield also fails to teach or suggest a dispersion comprising an antioxidant, and instead merely discloses the presence of an antioxidant in a fuel.

Wakefield fails to recognize or suggest that the addition of the claimed antioxidant agent to the dispersion, and not the fuel itself, will improve the stability of the dispersion. Thus, Wakefield also fails to teach or suggest dispersions comprising an antioxidant.

As such, the combination of Blanchard and Wakefield would not result in a colloidal dispersion comprising an antioxidant as recited in Claim 16, and Claim 16 is patentable over the references as combined.

Additionally, Appellants have found that the claimed dispersions including antioxidants exhibit superior properties as compared to prior art fuel additives that do not include antioxidants. For example, Appellants unexpectedly found that the addition of antioxidant improved the ability of cerium to remain in a condition of colloidal dispersion as compared to comparative examples without antioxidant. As shown in Example 1, quantities of diesel fuel and dispersion are such that the initial cerium content of the mixture formed is 7 ppm. (page 14, lines 36-38). Table 1, reproduced below, shows that when an antioxidant is included, all or nearly all the initial cerium content is found, indicating that it has remained in the state of a colloidal dispersion.

Table 1

Aging time/temperature	Without Antioxidant	With 20 ppm antioxidant	With 50 ppm antioxidant
12 h/80°C	4.7	6.9	6.2
3 h/90°C	2.7	6.9	6.4
3 h/120°C	2.0	7.0	6.8

Such evidence of unobvious or unexpected advantageous properties, such as superiority in a property the claimed compound shares with the prior art, can rebut *prima facie* obviousness. MPEP §716.02(a)(II). Thus, independent Claim 16 is further patentable over the references as combined.

For at least these reasons, Appellants maintain that the rejection of Claim 16 is improper.

2. Rejection of Claims 17-19, 22, 24, 26-27 and 34

Claims 17-19, 22, 24, 26-27 and 34, which ultimately depend from Claim 16, are also patentable for at least the reasons Claim 16 is patentable. Thus, the rejection of these claims stand or fall with the rejection of Claim 16.

3. Rejection of Claim 25

Appellants maintain that the references as combined fail to teach or suggest all features of Claim 25.

The Office Action admits that "Blanchard does not specifically teach antioxidants," but contends that "the diluents of aromatic solvents and alcohols are equivalent to antioxidants." (Final Office Action at page 4)

Blanchard discloses colloidal dispersions of rare earth, but there is no disclosure in Blanchard of the addition of an antioxidant agent or that the presence of an antioxidant in a dispersion enhances the stability of particles in a fuel. Instead, Blanchard discloses the use of cryo-TEM to examine the state of aggregation of the elementary particles. The samples are kept frozen in their natural medium, which is either water or organic diluents such as aromatic or aliphatic solvents, for example

Solvesso or Isopar, or certain alcohols such as ethanol. (See paragraph [0026]). Thus, the diluents, which the Office Action alleges are used as antioxidants, are used only for examination of samples to freeze the particles and help determine aggregation thereof by TEM. However, there is no teaching or suggestion in Blanchard to include the diluents in organic colloidal dispersion for addition to fuels.

Moreover, Wakefield also fails to teach or suggest a dispersion comprising an antioxidant, and instead merely discloses the presence of an antioxidant in a fuel. Wakefield fails to recognize or suggest that the addition of the claimed antioxidant agent to the dispersion, and not the fuel itself, will improve the stability of the dispersion. Thus, Wakefield also fails to teach or suggest dispersions comprising an antioxidant.

As such, the combination of Blanchard and Wakefield would not result in a colloidal dispersion comprising an antioxidant as recited in Claim 25, and Claim 25 is patentable over the references as combined.

Additionally, Appellants have found that the claimed dispersions including antioxidants exhibit superior properties as compared to prior art fuel additives. As noted above, such evidence of unobvious or unexpected advantageous properties, such as superiority in a property the claimed compound shares with the prior art, can rebut *prima facie* obviousness. MPEP 716.02(a)(II).

Here, it was found that the addition of antioxidant improved the ability of cerium to remain in a condition of colloidal dispersion as compared to comparative examples without antioxidant. These superior and unexpected results are cited in the present specification, and show that when the antioxidant is present, all or nearly

all the initial cerium is found, indicating that it has remained in the state of a colloidal dispersion. *See* Table 1 as explained above.

In addition, Claim 25 recites, *inter alia*, particles in the form of aggregates whose d_{80}, advantageously d_{90}, is not more than 5 nanometers. Blanchard discloses particles with a d_{50} of 2.5 nm, and is silent with regard to d_{80} or d_{90}.

Accordingly, because the references as applied fail to disclose or suggest all features of the claim, Appellants respectfully submit that claim 25 is patentable and the rejection should be reversed.

4. Rejection of Claim 28

Claim 28, which depends from Claim 16, is patentable for at least the reasons Claim 16 is patentable.

Moreover, Claim 28 is separately patentable because Blanchard and Wakefield fail to teach or suggest a fuel additive as required by Claim 28.

Instead, Blanchard discloses colloidal dispersions of rare earth, but there is no disclosure in Blanchard of the addition of an antioxidant agent or that the presence of an antioxidant in a dispersion enhances the stability of particles in a fuel. Instead, Blanchard discloses the use of cryo-TEM to examine the state of aggregation of the elementary particles. The samples are kept frozen in their natural medium, which is either water or organic diluents such as aromatic or aliphatic solvents, for example Solvesso or Isopar, or certain alcohols such as ethanol. (See paragraph [0026]). Thus, the diluents, which the Office Action alleges are used as antioxidants, are used only for examination of samples to freeze the particles and help determine aggregation thereof by TEM. However, there is no teaching or suggestion in

Blanchard to include the diluents in organic colloidal dispersion for addition to fuels.

Moreover, Wakefield also fails to teach or suggest a dispersion comprising an antioxidant, and instead merely discloses the presence of an antioxidant in a fuel. Wakefield fails to recognize or suggest that the addition of the claimed antioxidant agent to the dispersion, and not the fuel itself, will improve the stability of the dispersion. Thus, Wakefield also fails to teach or suggest a fuel comprising a colloidal dispersion as an additive as recited in Claim 28.

As such, the combination of Blanchard and Wakefield would not result in a fuel comprising the colloidal dispersion of Claim 16 as an additive as recited in Claim 28, and Claim 28 is separately patentable over the references as combined for at least this additional reason.

5. Rejection of Claim 29

Claim 29, which depends from Claim 16, is patentable for at least the reasons Claim 16 is patentable.

Moreover, Claim 29 is separately patentable because Blanchard and Wakefield fail to teach or suggest a process for making a fuel comprising the step of mixing a colloidal dispersion as recited in Claim 16 with a conventional fuel.

Blanchard discloses colloidal dispersions of rare earth, but there is no disclosure in Blanchard of the addition of an antioxidant agent or that the presence of an antioxidant in a dispersion enhances the stability of particles in a fuel. Instead, Blanchard discloses the use of cryo-TEM to examine the state of aggregation of the elementary particles. The samples are kept frozen in their natural medium, which is either water or organic diluents such as aromatic or aliphatic solvents, for example

Solvesso or Isopar, or certain alcohols such as ethanol. (See paragraph [0026]). Thus, the diluents, which the Office Action alleges are used as antioxidants, are used only for examination of samples to freeze the particles and help determine aggregation thereof by TEM. However, there is no teaching or suggestion in Blanchard to include the diluents in organic colloidal dispersion for addition to fuels.

Moreover, Wakefield also fails to teach or suggest a dispersion comprising an antioxidant, and instead merely discloses the presence of an antioxidant in a fuel. Wakefield fails to recognize or suggest that the addition of the claimed antioxidant agent to the dispersion, and not the fuel itself, will improve the stability of the dispersion. Thus, Wakefield also fails to teach or suggest a process for making a fuel comprising the step of mixing a colloidal dispersion as recited in Claim 16 with a conventional fuel as recited in Claim 29

As such, the combination of Blanchard and Wakefield would not result in a a process for making a fuel comprising the step of mixing a colloidal dispersion as recited in Claim 16 with a conventional fuel as recited in Claim 29, and Claim 29 is separately patentable over the references as combined.

6. Rejection of Claim 30

Appellants maintain that the references as combined fail to teach or suggest all features of Claim 30.

The Office Action admits that "Blanchard does not specifically teach antioxidants," but contends that "the diluents of aromatic solvents and alcohols are equivalent to antioxidants." (Final Office Action at page 4)

Blanchard discloses colloidal dispersions of rare earth, but there is no disclosure in Blanchard of the addition of an antioxidant agent or that the presence of an antioxidant in a dispersion enhances the stability of particles in a fuel. Instead, Blanchard discloses the use of cryo-TEM to examine the state of aggregation of the elementary particles. The samples are kept frozen in their natural medium, which is either water or organic diluents such as aromatic or aliphatic solvents, for example Solvesso or Isopar, or certain alcohols such as ethanol. (See paragraph [0026]). Thus, the diluents, which the Office Action alleges are used as antioxidants, are used only for examination of samples to freeze the particles and help determine aggregation thereof by TEM. However, there is no teaching or suggestion in Blanchard to include the diluents for addition to fuels.

Moreover, Wakefield also fails to teach or suggest a dispersion comprising an antioxidant, and instead merely discloses the presence of an antioxidant in a fuel. Wakefield fails to recognize or suggest that the addition of the claimed antioxidant agent to the dispersion, and not the fuel itself, will improve the stability of the dispersion. Thus, Wakefield also fails to teach or suggest a fuel additive in the form of a colloidal dispersion comprising an antioxidant as recited in Claim 30.

As such, the combination of Blanchard and Wakefield would not result in a fuel additive in the form of a colloidal dispersion comprising an antioxidant as recited in Claim 30, and Claim 30 is patentable over the references as combined.

Additionally, Appellants have found that the claimed dispersions including antioxidants exhibit superior properties as compared to prior art fuel additives. As noted above, such evidence of unobvious or unexpected advantageous properties,

such as superiority in a property the claimed compound shares with the prior art, can rebut *prima facie* obviousness. MPEP 716.02(a)(II).

Here, it was found that the addition of antioxidant improved the ability of cerium to remain in a condition of colloidal dispersion as compared to comparative examples without antioxidant. These superior and unexpected results are cited in the present specification, and show that when the antioxidant is present, all or nearly all the initial cerium content is found, indicating that it has remained in the state of a colloidal dispersion. *See* Table 1, as explained above. As such, independent Claim 30 is patentable over the references as combined and the rejection thereof should be reversed.

7. Rejection of Claims 31-33

Claims 31-33, which ultimately depend from Claim 30, are also patentable for at least the reasons Claim 30 is patentable. Thus, the rejection of these claims stand or fall with the rejection of Claim 30.

8. Rejection of Claim 36

Appellants maintain that the references as combined fail to teach or suggest all features of Claim 36.

The Office Action admits that "Blanchard does not specifically teach antioxidants," but contends that "the diluents of aromatic solvents and alcohols are equivalent to antioxidants." (Final Office Action at page 4)

Blanchard discloses colloidal dispersions of rare earth, but there is no disclosure in Blanchard of the addition of an antioxidant agent or that the presence of

an antioxidant in a dispersion enhances the stability of particles in a fuel. Instead, Blanchard discloses the use of cryo-TEM to examine the state of aggregation of the elementary particles. The samples are kept frozen in their natural medium, which is either water or organic diluents such as aromatic or aliphatic solvents, for example Solvesso or Isopar, or certain alcohols such as ethanol. (See paragraph [0026]). Thus, the diluents, which the Office Action alleges are used as antioxidants, are used only for examination of samples to freeze the particles and help determine aggregation thereof by TEM. However, there is no teaching or suggestion in Blanchard to include the diluents in organic colloidal dispersion for addition to fuels.

Moreover, Wakefield also fails to teach or suggest a dispersion comprising an antioxidant, and instead merely discloses the presence of an antioxidant in a fuel. Wakefield fails to recognize or suggest that the addition of the claimed antioxidant agent to the dispersion, and not the fuel itself, will improve the stability of the dispersion. Thus, Wakefield also fails to teach or suggest dispersions comprising an antioxidant.

As such, the combination of Blanchard and Wakefield would not result in a colloidal dispersion comprising an antioxidant as recited in Claim 36, and Claim 36 is patentable over the references as combined.

Additionally, Appellants have found that the claimed dispersions including antioxidants exhibit superior properties as compared to prior art fuel additives. As noted above, such evidence of unobvious or unexpected advantageous properties, such as superiority in a property the claimed compound shares with the prior art, can rebut *prima facie* obviousness. MPEP 716.02(a)(II).

Here, it was found that the addition of antioxidant improved the ability of cerium to remain in a condition of colloidal dispersion as compared to comparative examples without antioxidant. These superior and unexpected results are cited in the present specification, and show that when the antioxidant is present, all or nearly all the initial cerium content is found, indicating that it has remained in the state of a colloidal dispersion. *See* Table 1, as explained above. As such, independent Claim 36 is patentable over the references as combined.

For at least these reasons, Appellants maintain that the rejection of Claim 36 is improper.

9. Rejection of Claim 37

Appellants maintain that the references as combined fail to teach or suggest all features of the method of Claim 37.

The Office Action admits that "Blanchard does not specifically teach antioxidants," but contends that "the diluents of aromatic solvents and alcohols are equivalent to antioxidants." (Final Office Action at page 4)

Blanchard discloses colloidal dispersions of rare earth, but there is no disclosure in Blanchard of the addition of an antioxidant agent or that the presence of an antioxidant in a dispersion enhances the stability of particles in a fuel. Instead, Blanchard discloses the use of cryo-TEM to examine the state of aggregation of the elementary particles. The samples are kept frozen in their natural medium, which is either water or organic diluents such as aromatic or aliphatic solvents, for example Solvesso or Isopar, or certain alcohols such as ethanol. (See paragraph [0026]). Thus, the diluents, which the Office Action alleges are used as antioxidants, are

used only for examination of samples to freeze the particles and help determine aggregation thereof by TEM. However, there is no teaching or suggestion in Blanchard to include the diluents in organic colloidal dispersion for addition to fuels. Thus, there is no evidence of record to indicate that the diluents of aromatic solvents and alcohols of Blanchard necessarily include antioxidants, and Appellants maintain that Blanchard fails to teach or suggest providing colloidal dispersions including antioxidants as recited in the method of Claim 37. Thus, the Office Action improperly relies on Blanchard for disclosure of colloidal dispersions including antioxidants as claimed.

Moreover, Wakefield also fails to teach or suggest a dispersion comprising an antioxidant, and instead merely discloses the presence of an antioxidant in a fuel. Wakefield fails to recognize or suggest that the addition of the claimed antioxidant agent to the dispersion, and not the fuel itself, will improve the stability of the dispersion. Thus, Wakefield also fails to teach or suggest step (b) of the method of Claim 37.

As such, the combination of Blanchard and Wakefield would not result in the method as recited in Claim 37, and Claim 37 is patentable over the references as combined.

Additionally, Appellants have found that the claimed dispersions including antioxidants exhibit superior properties as compared to prior art fuel additives. As noted above, such evidence of unobvious or unexpected advantageous properties, such as superiority in a property the claimed compound shares with the prior art, can rebut *prima facie* obviousness. MPEP 716.02(a)(II).

Here, it was found that the addition of antioxidant improved the ability of cerium to remain in a condition of colloidal dispersion as compared to comparative examples without antioxidant. These superior and unexpected results are cited in the present specification, and show that when the antioxidant is present, all or nearly all the initial cerium is found, indicating that it has remained in the state of a colloidal dispersion. *See* Table 1, as explained above. As such, independent Claim 37 is patentable over the references as combined.

For at least these reasons, Appellants maintain that the rejection of Claim 37 is improper.

In addition, Claim 37 recites, *inter alia*, particles in the form of aggregates whose d_{80}, advantageously d_{90}, is not more than 5 nanometers. Blanchard discloses particles with a d_{50} of 2.5 nm, and is silent with regard to d_{80} or d_{90}.

Accordingly, because the references as applied fail to disclose or suggest all features of the claim, Appellants respectfully submit that Claim 37 is patentable and the rejection should be reversed.

VIII. Claims Appendix

See attached Claims Appendix for a copy of the claims involved in the appeal.

IX. Evidence Appendix

See attached Evidence Appendix for copies of evidence relied upon by Appellant.

X. Related Proceedings Appendix

See attached Related Proceedings Appendix for copies of decisions identified in Section II, supra.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date May 2, 2011

By: 
Nancy K. Britt
Registration No. 57856

Customer No. 21839
703 836 6620

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VIII. CLAIMS APPENDIX

The Appealed Claims

16. A colloidal dispersion comprising particles of a rare earth compound, an acid, an organic phase, an antioxidant, and an element E; wherein at least 90% by weight of the particles are monocrystalline, wherein the rare earth compound is cerium and the element E is iron.

17. The dispersion as claimed in claim 16, wherein the antioxidant is selected from the group consisting of a substituted derivative of phenol, an aromatic amine and a tocopherol.

18. The dispersion as claimed in claim 17, wherein the antioxidant is an alkyl- or alkoxyphenol.

19. The dispersion as claimed in claim 18, wherein the antioxidant is 2,6-di-tert-butylphenol, 2,6-di-tert-butyl paracresol, or 2-tert-butyl-4-methoxyphenol.

22. The dispersion as claimed in claim 16, wherein the acid is an amphiphilic acid.

24. The dispersion as claimed in claim 16, wherein the particles have a d_{50} of between 1 and 5 nm.

25. A colloidal dispersion comprising particles of a rare earth compound, an acid, an organic phase, an antioxidant, and an element E, wherein the particles are not larger than 200 nm, said dispersion having the following characteristics:

said particles are in the form of aggregates of crystallites whose d_{80}, advantageously d_{90}, is not more than 5 nanometers, 90% (by weight) or more of the aggregates comprising 1 to 5 crystallites; and the acid is an amphiphilic acid comprising at least one acid with 11 to 50 carbon atoms, having at least one alpha, beta, gamma, or delta branch of the atom bearing the acidic hydrogen,

wherein the rare earth compound is cerium and the element E is iron.

26. The dispersion as claimed in claim 16, wherein the particles of a rare earth compound that have been obtained by a method comprising the following steps:

a) a solution is prepared comprising at least one soluble salt, optionally a rare earth acetate or chloride;

b) the solution is contacted with a basic medium forming a reaction mixture maintained at a basic pH to form a precipitate; and

c) the precipitate formed is recovered by spraying or freeze-drying.

27. The dispersion as claimed in claim 16, wherein the acid is a fatty acid of tallol, soybean oil, tallow, linseed oil, oleic acid, linoleic acid, stearic acid, an isomer thereof, pelargonic acid, capric acid, lauric acid, myristic acid, dodecylbenzenesulfonic acid, ethyl-2-hexanoic acid, naphthenic acid, hexoic acid, toluenesulfonic acid, toluenephosphonic acid, laurylsulfonic acid, laurylphosphonic acid, palmitylsulfonic acid, or palmitylphosphonic acid.

28. A fuel for internal combustion engines with enhanced stability of the particles of the rare earth compound comprising a colloidal dispersion as defined in claim 16, as an additive.

29. A process for making a fuel for an internal combustion engine, comprising the step of mixing a colloidal dispersion as defined in claim 16 with a conventional fuel.

30. A fuel additive in the form of a colloidal dispersion, the colloidal dispersion comprising particles of a rare earth compound, an acid, an organic phase, an antioxidant, and an element E, wherein an atomic ratio of antioxidant to rare earth compound and the element E is 0.2 to 5.0 and wherein the rare earth compound is cerium and the element E is iron.

31. The additive of claim 30, wherein the atomic ratio is 0.2 to 3.0.

32. The additive of claim 31, wherein the atomic ratio is 0.5 to 2.0.

33. The additive of claim 30, comprising up to 90% by weight of the rare earth oxide and element E, with respect to the total weight of the dispersion.

34. The dispersion of claim 16, wherein a weight ratio between the organic phase and acid is 0.3-2.0.

36. A method comprising:

(a) providing a colloidal dispersion comprising particles of a rare earth compound, an acid, an organic phase, an antioxidant, and an element E, wherein at least 90% by weight of the particles of the rare earth compound are monocrystalline; and

(b) combining the colloidal dispersion with a fuel for an internal combustion engine, thereby achieving enhanced stability of the particles of the rare earth compound in the fuel,

wherein the rare earth compound is cerium and the element E is iron.

37. A method comprising:

(a) providing a colloidal dispersion comprising particles of a rare earth compound, an acid, an organic phase, an antioxidant, and an element E, wherein the particles of the rare earth compound are not larger than 200 nm and are in the form of aggregates of crystallites whose d_{80}, advantageously d_{90}, is not more than 5 nanometers, 90% (by weight) or more of the aggregates comprising 1 to 5 crystallites, and the acid is an amphiphilic acid comprising at least one acid with 11 to 50 carbon atoms, having at least one alpha, beta, gamma, or delta branch of the atom bearing the acidic hydrogen; and

(b) combining the colloidal dispersion with a fuel for an internal combustion

engine, thereby achieving enhanced stability of the particles of the rare earth compound in the fuel,

wherein the rare earth compound is cerium and the element E is iron.

IX. EVIDENCE APPENDIX

None

X. RELATED PROCEEDINGS APPENDIX

None